UNESA	**Universitas Negeri Surabaya** **Faculty of Mathematics and Natural Sciences** **Bachelor of Science Education Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Earth and Space Knowledge	8420103123		T=3 P=0 ECTS=4.77	7	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Wahono Widodo, M.Si	.....	Prof. Dr. Erman, M.Pd.

Learning model	**Case Studies**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

PLO-5	Demonstrate scientific, critical, and innovative attitudes in integrated science learning, laboratory activities, and professional-related tasks
PLO-11	Design and conduct research about learning of integrated science, and acquire, analyze, and interpret the research data
PLO-13	Demonstrate knowledge of integrated science (physics, chemistry, and biology)

Program Objectives (PO)

PO - 1	Able to show a responsible attitude, demonstrate a scientific, critical and innovative attitude independently during the lecture process
PO - 2	Able to master physical phenomena on earth and space, including: the structure of the earth, lithosphere, atmosphere, solar system and other celestial bodies, as well as analyzing the theory of the evolution of the universe.
PO - 3	Able to show a responsible attitude, demonstrate a scientific, critical and innovative attitude independently during the lecture process

PLO-PO Matrix

P.O	PLO-5	PLO-11	PLO-13
PO-1			
PO-2			
PO-3			

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																
PO-3																

Short Course Description	This course discusses physical phenomena on earth and space, including: the structure of the earth, lithosphere, atmosphere, solar system and other celestial bodies, as well as analyzing the theory of the evolution of the universe.

References

Main :

1. Lunine,Jonathan.2013.Eart Evolution Of a Habitable Word. NY
2. Lyons, Suzanne, et al. 2007. Conceptual Integrated Science. NY
3. Buku Panduan Mata Kuliah Pengetahuan Bumi dan Antariksa yang disusun oleh TIM

Supporters:

Supporting lecturer	Prof.Dr. Wahono Widodo, M.Si. Tutut Nurita, S.Pd., M.Pd. An Nuril Maulida Fauziah, S.Pd., M.Pd. Muhamad Arif Mahdiannur, S.Pd., M.Pd. Dyah Permata Sari, S.Pd., M.Pd.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the earth (lithosphere) 2. Analyzing information on the layers of the earth (lithosphere) 3. Analyzing natural phenomena in the lithosphere layer, including the mechanism of volcanic eruptions, earthquakes and tsunamis 4. Communicate efforts to overcome natural disasters in the lithosphere layer	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities	Case based learning 3 X 50‘	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60‘	**Material:** Lithosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Lithosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Lithosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Lithosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%
2	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the earth (lithosphere) 2. Analyzing information on the layers of the earth (lithosphere) 3. Analyzing natural phenomena in the lithosphere layer, including the mechanism of volcanic eruptions, earthquakes and tsunamis 4. Communicate efforts to overcome natural disasters in the lithosphere layer	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities	Case based learning 3 X 50‘	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60‘	**Material:** Lithosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Lithosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Lithosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Lithosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%
3	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the earth (lithosphere) 2. Analyzing information on the layers of the earth (lithosphere) 3. Analyzing natural phenomena in the lithosphere layer, including the mechanism of volcanic eruptions, earthquakes and tsunamis 4. Communicate efforts to overcome natural disasters in the lithosphere layer	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Test	Case based learning 3 X 50‘	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60‘	**Material:** Lithosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Lithosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Lithosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Lithosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%

4	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the earth (hydrosphere) 2. Analyze information on the hydrological cycle on Earth 3. Analyzing natural phenomena affected by the hydrosphere layer 4. Analyze the effects of human activities that can cause pollution in the hydrosphere layer 5. Communicate mitigation efforts to the hydrosphere affected by natural disasters and human-caused pollution	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric)	Case based learning 3 X 50‘	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60‘	**Material:** Hydrosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Hydrosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Hydrosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Hydrosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%
5	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the earth (hydrosphere) 2. Analyze information on the hydrological cycle on Earth 3. Analyzing natural phenomena affected by the hydrosphere layer 4. Analyze the effects of human activities that can cause pollution in the hydrosphere layer 5. Communicate mitigation efforts to the hydrosphere affected by natural disasters and human-caused pollution	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Case based learning 3 X 50‘	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60‘	**Material:** Hydrosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Hydrosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Hydrosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Hydrosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%

6	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the Earth (atmosphere) 2. Analyze information on Earth's atmospheric layers 3. Analyze activities in nature that affect the layers of the atmosphere 4. Analyzing the effects of human activities that can cause pollution in the atmosphere 5. Utilizing science and technology to solve problems related to atmospheric layers	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities, Tests	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Hydrosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Hydrosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Hydrosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Hydrosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	5%
7	Analyze physical phenomena on earth by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with his team in completing assignments	1. Explain the characteristics of the Earth (atmosphere) 2. Analyze information on Earth's atmospheric layers 3. Analyze activities in nature that affect the layers of the atmosphere 4. Analyzing the effects of human activities that can cause pollution in the atmosphere 5. Utilizing science and technology to solve problems related to atmospheric layers	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric)	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Hydrosphere **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Hydrosphere **References:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Hydrosphere **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Hydrosphere **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	10%
8	-	Sub-CMPK 1st to 7th Meetings	**Criteria:** Accuracy and mastery according to the UTS assessment indicators (assessment rubric). **Form of Assessment** : Test	Mid-Semester Evaluation/Mid-Semester Examination (UTS) 2 X 50'		**Material:** - **Library:**	0%
9	Analyze the solar system (earth, moon, sun, planets of the solar system) and the influence of the Earth's rotation and revolution on life by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with the team in completing assignments	1. Explain the theory of the origin of the solar system 2. Analyze the solar system 3. Identify planets and their satellites in the solar system 4. Analyze the process of lunar eclipses and solar eclipses 5. Utilize science and technology to solve problems	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Solar System **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Solar System **Bibliography:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Solar System **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Solar System	10%

		related to the solar system				**Bibliography:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** Solar System **Bibliography:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Solar System **References:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** Solar System **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Solar System **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"SkyView® Lite - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Reference:** *"Apparent retrograde motion - Wikipedia". nd, available at: https://en.wikipedia.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"Javanese Calendar - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"Sultan Agungan Javanese Calendar | Ngayogyakarta Hadiningrat Palace - Jogja Palace". nd, available at: https://www.kratonjogja.id/... (accessed 9 December 2019).* **Material:** Solar System **Reference:** *"Perseid meteors 2019: All you need to know | Astronomy Essentials | EarthSky." nd, available at: https://earthsky.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *Agriculture Division. nd Practical Guide to Determining When to Plant Based on Pranoto Mongso, available at: www.pplhseloliman.or.id (accessed 9 December 2019).* **Material:** Solar System **Bibliography:** *"Prey system - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).*	
10	Analyze the solar system (earth, moon, sun, planets of the	1.Explain the theory of the	**Criteria:** Accuracy and mastery according	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet	**Material:** Solar System **References:** *Trefil, J. and Hazen, RM (2016). The*	10%

	solar system) and the influence of the Earth's rotation and revolution on life by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with the team in completing assignments	origin of the solar system 2. Analyze the solar system 3. Identify planets and their satellites in the solar system 4. Analyze the process of lunar eclipses and solar eclipses 5. Utilize science and technology to solve problems related to the solar system	to assessment indicators (assessment rubric) **Forms of Assessment** : Participatory Activities, Practical Assessment, Tests		Asynchronous via LMS Unesa 3 x 60'	*Sciences: An Integrated Approach. Wiley Global Education* **Material:** Solar System **Bibliography:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Solar System **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Solar System **Bibliography:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** Solar System **Bibliography:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Solar System **References:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** Solar System **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Solar System **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"SkyView® Lite - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Reference:** *"Apparent retrograde motion - Wikipedia". nd, available at: https://en.wikipedia.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"Javanese Calendar - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"Sultan Agungan Javanese Calendar | Ngayogyakarta Hadiningrat Palace - Jogja Palace". nd, available at: https://www.kratonjogja.id/... (accessed 9 December 2019).* **Material:** Solar System **Reference:** *"Perseid meteors 2019: All you need to know | Astronomy Essentials | EarthSky." nd, available at: https://earthsky.org/... (accessed 9 December 2019).* **Material:** Solar System	

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11	Analyze the solar system (earth, moon, sun, planets of the solar system) and the influence of the Earth's rotation and revolution on life by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with the team in completing assignments	1. Explain the theory of the origin of the solar system 2. Analyze the solar system 3. Identify planets and their satellites in the solar system 4. Analyze the process of lunar eclipses and solar eclipses 5. Utilize science and technology to solve problems related to the solar system	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities, Practical Assessment	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Solar System **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Solar System **Bibliography:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Solar System **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Solar System **Bibliography:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** Solar System **Bibliography:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Solar System **References:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** Solar System **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Solar System **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"SkyView® Lite - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Reference:** *"Apparent retrograde motion - Wikipedia". nd, available at: https://en.wikipedia.org/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"Javanese Calendar - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).*	10%

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12	Analyze the evolution of stars by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with the team in completing assignments	1. Explain the theory of stellar cosmology 2. Analyzing the theory of stellar cosmology 3. Utilizing science and technology to solve astronomical problems	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Forms of Assessment** : Participatory Activities, Practical Assessment, Tests	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Solar System **References:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Solar System **Bibliography:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J.(2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Solar System **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Solar System **Bibliography:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** Solar System **Bibliography:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Solar System **References:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** Solar System **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Solar System **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Solar System **Library:** *"SkyView® Lite - Apps on Google Play". nd,*	10%

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13	Analyze the Earth (origin, origin of the hydrosphere, origin of life) by utilizing science and technology to explore data and information and be responsible for self-learning, assignments and agreements with the team in completing assignments	1. Explains the theory of the origins of the Earth, the hydrosphere layer, and the beginning of life on Earth 2. Analyze the theory of the origins of the Earth, the hydrosphere layer, and the beginning of life on Earth 3. Identify theories of the origins of the Earth, hydrosphere layers, and the beginning of life on Earth 4. Analyze the process of the Earth, the hydrosphere and the beginning of life on Earth 5. Utilizing science and technology to solve problems related to the earth	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Form of Assessment** : Participatory Activities, Practical Assessment	Case based learning 3 X 50'	Case based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** Bumi **Pustaka:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Bumi **Library:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** Earth **Library:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Bumi **Pustaka:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.*	10%
							10%

14	Make proposals, activity plans, and project products (portfolio) related to PBA learning media by utilizing science and technology and be responsible for self-learning, assignments, and agreement/cooperation with the team in completing assignments.	1. Create and perfect teaching aids and guidebooks related to the material topics that have been given 2. Carry out the steps of the scientific method in completing the teaching aids 3. Utilize science and technology to solve problems related to teaching aids according to the topic material that has been given 4. Present the results of the teaching aids along with the guidelines according to the material that has been provided	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Project based learning 3 X 50'	Project based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** The Sciences: An Integrated Approach **Bibliography:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Earth **Reference:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Conceptual Integrated Science **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J. (2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Astronomy **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Earth and Moon **Reference:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** The cosmos: A spacetime odyssey **References:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Astronomy **Bibliography:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** PBA **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Sky Map **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** SkyView **Library:** *"SkyView® Lite - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Apparent retrograde motion **Reference:** *"Apparent retrograde motion - Wikipedia". nd, available at: https://en.wikipedia.org/... (accessed 9 December 2019).* **Material:** Javanese Calendar **Bibliography:** *"Javanese Calendar - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).* **Material:** Sultan Agungan's Javanese Calendar **Library:** *"Sultan Agungan's Javanese Calendar | Ngayogyakarta Hadiningrat Palace - Jogja Palace". nd, available at:*	10%

						https://www.kratonjogja.id/... (accessed 9 December 2019). **Material:** Perseid meteors **Reference:** *"Perseid meteors 2019: All you need to know | Astronomy Essentials | EarthSky". nd, available at: https://earthsky.org/... (accessed 9 December 2019).* **Material:** Practical Guide to Determining When to Plant Based on Pranoto Mongso **Library:** *Agriculture Division. nd Practical Guide to Determining When to Plant Based on Pranoto Mongso, available at: www.pplhseloliman.or.id (accessed 9 December 2019).* **Material:** Prey structures **Bibliography:** *"Prey structures - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).*	
15	Make proposals, activity plans, and project products (portfolio) related to PBA learning media by utilizing science and technology and be responsible for self-learning, assignments, and agreement/cooperation with the team in completing assignments.	1. Create and perfect teaching aids and guidebooks related to the material topics that have been given 2. Carry out the steps of the scientific method in completing the teaching aids 3. Utilize science and technology to solve problems related to teaching aids according to the topic material that has been given 4. Present the results of the teaching aids along with the guidelines according to the material that has been provided	**Criteria:** Accuracy and mastery according to assessment indicators (assessment rubric) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Project based learning 3 X 50'	Project based learning (synchronous) via Zoom/Google Meet Asynchronous via LMS Unesa 3 x 60'	**Material:** The Sciences: An Integrated Approach **Bibliography:** *Trefil, J. and Hazen, RM (2016). The Sciences: An Integrated Approach. Wiley Global Education* **Material:** Earth **Reference:** *Lunine, JI (2013). Earth: evolution of a habitable world. Cambridge University Press.* **Material:** Conceptual Integrated Science **References:** *Hewitt, PG, Lyons, SA, Suchocki, JA and Yeh, J. (2013). Conceptual Integrated Science: Pearson New International Edition. Pearson Higher Ed.* **Material:** Astronomy **Bibliography:** *Roy, AE and Clarke, D. (2003). Astronomy: Principles and Practice, (PBK). CRC Press* **Material:** Earth and Moon **Reference:** *Ringwood, AE (2012). Origin of the Earth and Moon. Springer Science & Business Media.* **Material:** The cosmos: A spacetime odyssey **References:** *Druyan, A., MacFarlane, S., Cannold, M., Braga, B. and Clark, J. (2014). The cosmos: A spacetime odyssey [Video Series]. Beverly Hills, CA: Twentieth Century Fox* **Material:** Astronomy **Bibliography:** *Selin, H. ed. (2012). Astronomy across cultures: the history of non-Western astronomy (Vol. 1). Springer Science & Business Media.* **Material:** PBA **Library:** *IPBA Teaching Materials Development Team. nd IPBA Textbook. Unesa University Press.* **Material:** Sky Map **Library:** *"Sky Map - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).*	10%

						Material: SkyView **Library:** *"SkyView® Lite - Apps on Google Play". nd, available at: https://play.google.com/... (accessed 9 December 2019).* **Material:** Apparent retrograde motion **Reference:** *"Apparent retrograde motion - Wikipedia". nd, available at: https://en.wikipedia.org/... (accessed 9 December 2019).* **Material:** Javanese Calendar **Bibliography:** *"Javanese Calendar - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).* **Material:** Sultan Agungan's Javanese Calendar **Library:** *"Sultan Agungan's Javanese Calendar | Ngayogyakarta Hadiningrat Palace - Jogja Palace". nd, available at: https://www.kratonjogja.id/... (accessed 9 December 2019).* **Material:** Perseid meteors **Reference:** *"Perseid meteors 2019: All you need to know | Astronomy Essentials | EarthSky". nd, available at: https://earthsky.org/... (accessed 9 December 2019).* **Material:** Practical Guide to Determining When to Plant Based on Pranoto Mongso **Library:** *Agriculture Division. nd Practical Guide to Determining When to Plant Based on Pranoto Mongso, available at: www.pplhseloliman.or.id (accessed 9 December 2019).* **Material:** Prey structures **Bibliography:** *"Prey structures - Indonesian Wikipedia, the free encyclopedia". nd, available at: https://id.wikipedia.org/... (accessed 9 December 2019).*	
16	-	Sub-CMPK 1 to 15	**Criteria:** Accuracy and mastery according to the UAS assessment indicators (assessment rubric). **Form of Assessment** : Test	Final Semester Evaluation/Final Exam 2 x 50'		**Material:** - **Library:**	0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	49.99%
2.	Project Results Assessment / Product Assessment	10.83%
3.	Practical Assessment	16.66%
4.	Test	17.49%
		94.97%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.

2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.